

Six Sigma, Programs, and Proactive Risk Management

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Organizational Strategy

- To enhance its effectiveness, efficiency, and adaptability, an organization needs to integrate:
 - Improvement of current products, services, processes, and technologies
 - Quality improvement initiatives and Six Sigma method
 - Introduction of new products, services, processes, and technologies
 - Program and project management.

Overview of Six Sigma

- Project-driven business systems improvement approach that focuses on:
 - Improving Business systems across the organization's functions: production, marketing, administration, etc.
 - Reducing defects, waste, and cost

Continued...

Overview of Six Sigma (Continued)

- Developing robust products and processes
- Enhancing the organization's financial performance
- Achieving sustained competitive advantage through continual improvement of all business systems in the organization

Reported Successes of Six Sigma Projects

- Motorola
 - saving \$15 billion (US) over 11 years
- General Electric
 - saving \$2 billion (US) in one year
- DuPont's Yerkes Plant
 - saving > \$2 million (US)
- Dow Chemical's rail delivery project
 - saving \$2.45 million (US)

Continued...

Reported Successes of Six Sigma Projects

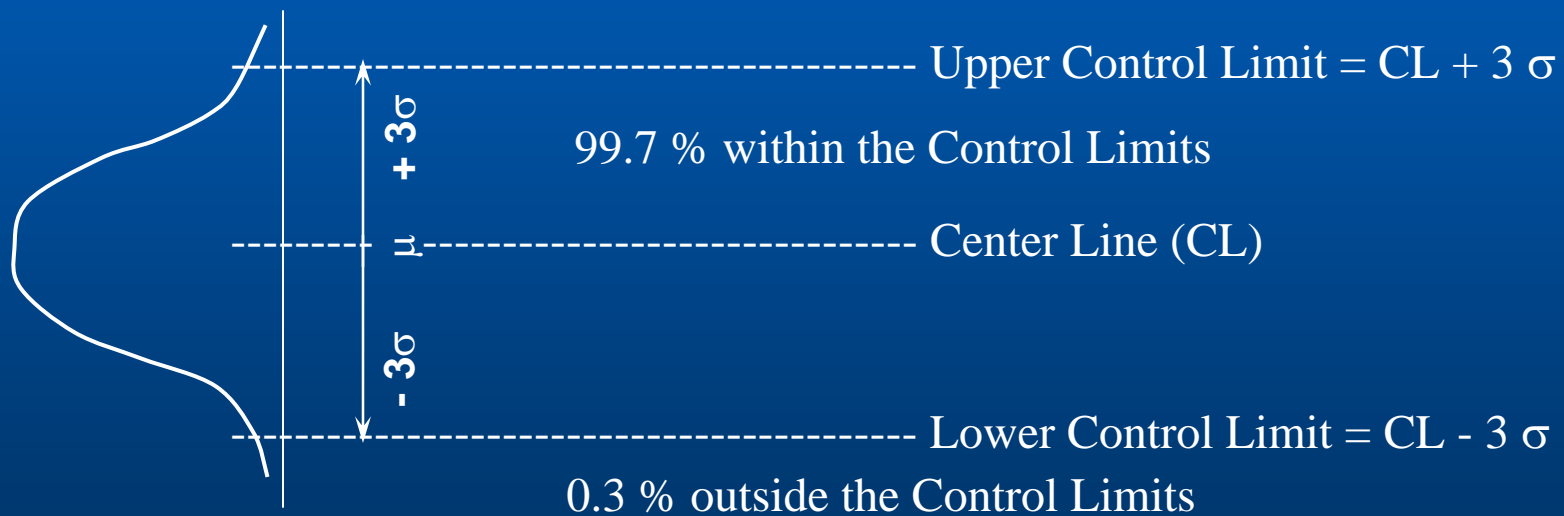
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- Bechtel Corporation
 - savings \$200 million (US) with an investment of \$30 million (US) in Six Sigma
- Many other organizations
 - Boeing, Honeywell, Kodak, Toshiba, Seagate, Delphi, Scott Paper, 3M, Xerox ...
- Non-financial benefits
 - Customer satisfaction, improving development speed, ...

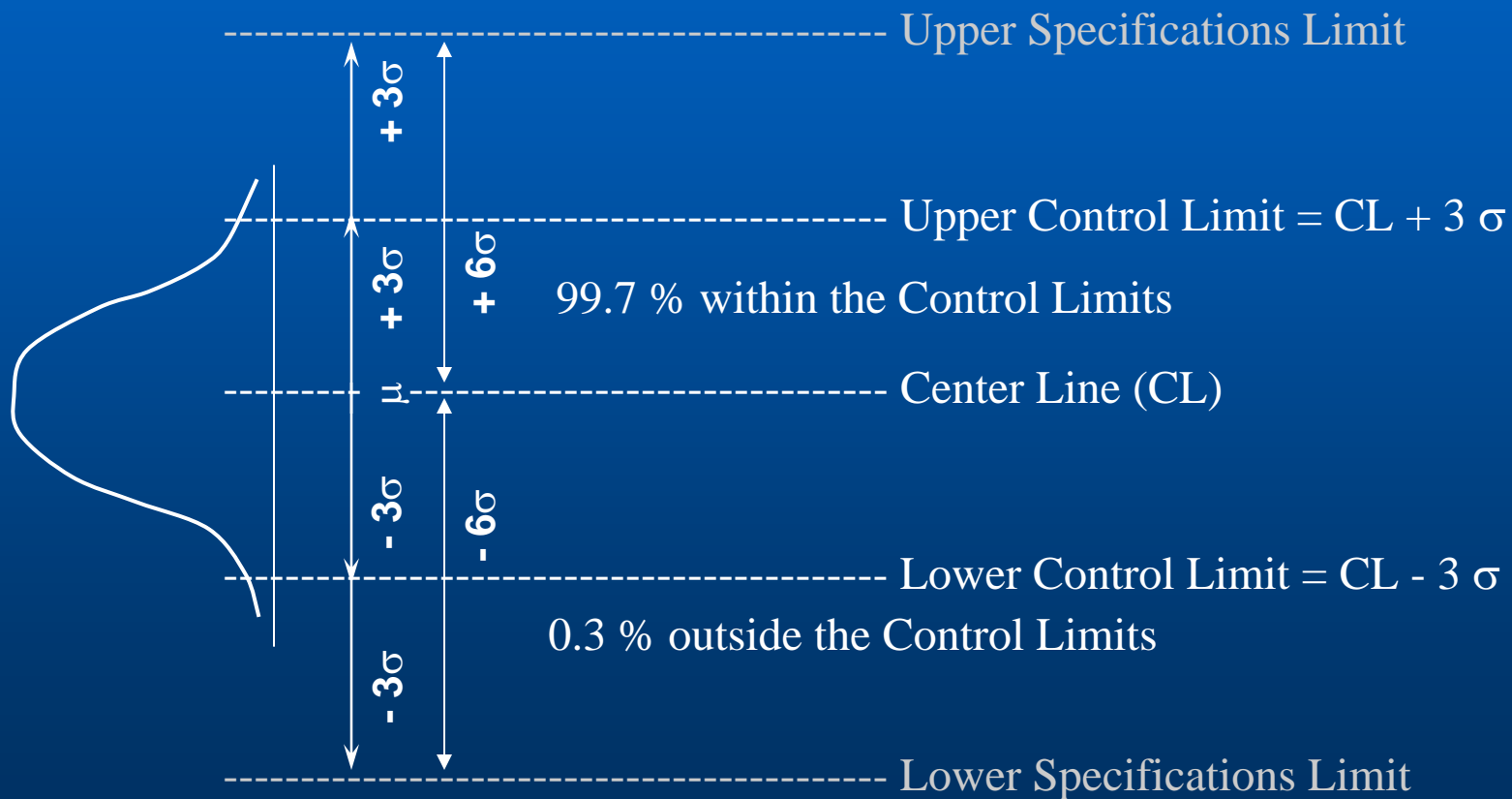
Theoretical Basis of Six Sigma: Variation

- Common Cause Variation
 - System
 - Random
- Special Cause Variation
 - Assignable

Statistical Control Limits



Specifications Limits and Statistical Control Limits



Statistical Metric of Six Sigma

- Six sigma method strives to achieve a success rate of 99.99966% (3.4 defects per million opportunities)
- May not be measurable in individual projects
- Method could provide important insights and may be of particular interest to high reliability organizations, such as NASA

Business Perspective of Six Sigma

Six Sigma = TQM (or CQI)
+ Stronger Customer Focus
+ Additional Tools
(DOE, Multi-Vari, FMEA,
Regression, etc....)
+ Financial Results
+ Project Management

Proactive Risk Management

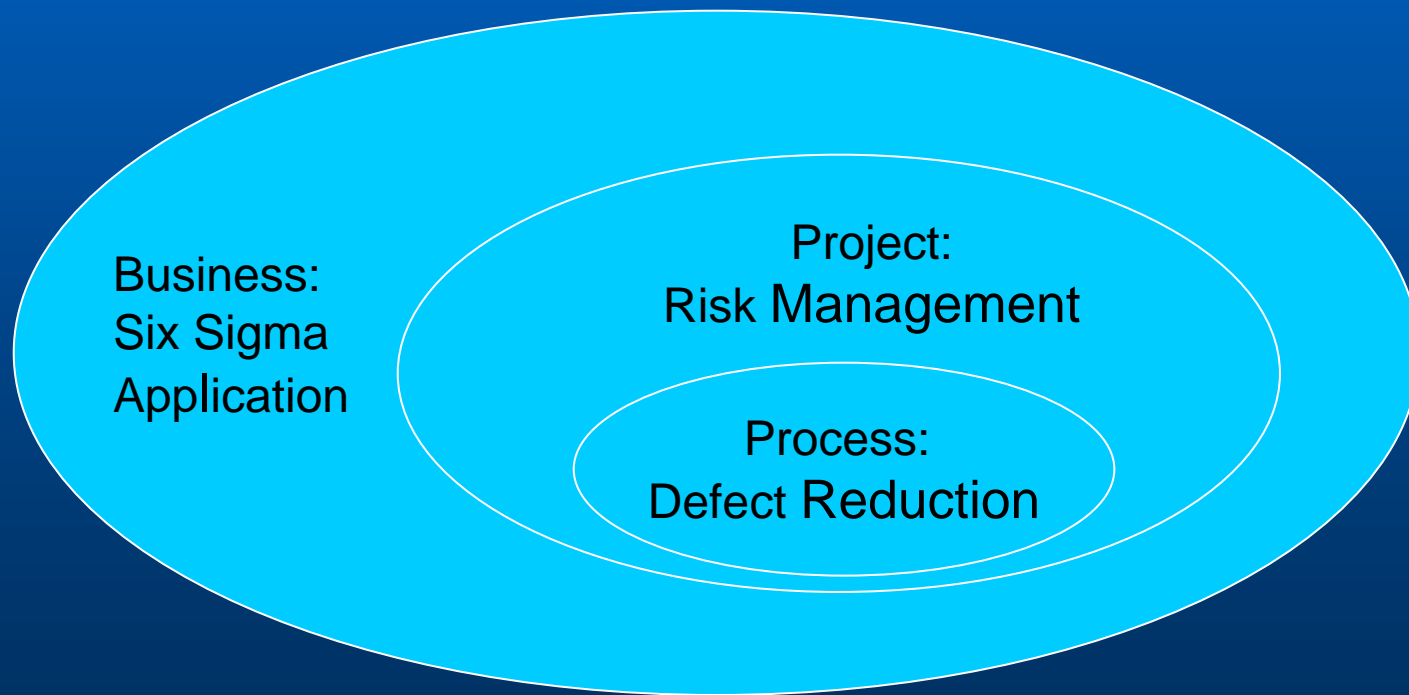
- Definitions of Risk Management
 - To increase the probability and impact of positive events, and decrease the probability and impact of events adverse to the project (PMBOK® Guide 2004)
 - Opportunity Management (Kirkpatrick 1992)
 - Uncertainty Management (Chapman 2000)
 - Surprise Management (Smith & Merritt 2002)
 - Failure-Proof Management (Kendrick 2003)

Six Sigma and Risk

- An objective of six sigma is to reduce variation and various adverse risk events (technical, managerial, financial, organizational, etc.) related to business, project, and process.

Application of Six Sigma

- Six Sigma application incorporates business, project, and process levels



Benefits of Six Sigma

- Owner's Perspective:
 - Reduce the probability and impact of negative business (financial) risk exposures
- Contractor's Perspective:
 - Increase the probability and impact of benefits by reducing risk of project (cost, schedule, and specifications) and process (defects)

Integration of Six Sigma and Risk

- Incorporating risk management concept into Six Sigma principles and training
- Aligning the tools and techniques commonly used in Six Sigma and risk management
- Realizing risk management as a key element of implementing the Six Sigma method successfully

Implementation of Six Sigma

- Six Sigma principles and techniques could be implemented to reduce
 - Business Risks (ROI, Culture, Organization, etc.)
 - Project Risks (Cost, Schedule, Specifications, etc.)
 - Process Risks (Defects and Errors)
 - Other Risks

Reported Failures of Traditional Projects

- Information Technology Projects
 - The Standish Group Studies

Year	Successful	Challenged	Failed
1994	16%	53%	31%
1998	26%	46%	28%

- The Treasury Board of Canada Secretariat (2000-2003)
- Sauer and Cuthbertson (2002, 2003) Studies

Continued...

Reported Failures of Traditional Projects

(Continued)

- Major Projects
 - Iridium
 - Superconducting Super-Collider
 - Denver International Airport
 - Etc.
- Infrastructure Development Projects
- Others??

Six Sigma Projects vs. Traditional Projects

- There is a significant difference between sustained successes of Six Sigma projects and repetitive, visible failures in managing traditional projects
- This study explores underlying root causes of this difference

Research Methodology

- Extensive literature reviews
 - Reviewed datasets from 40+ organization in manufacturing, financial, healthcare, engineering and construction, research and development, etc.
- Discussions with Six Sigma leaders from 4 major organizations
- Observations of business systems improvement projects

Typical Profile of Six Sigma Projects

- Expected financial benefit per project:
\$100,000 (US) - \$500,000. Target: \$175,000 (US)
 - Some organizations target smaller benefits
- Project duration: Three to Six Months
 - Larger projects are broken down to smaller projects, with specific benefits

Participants' Roles

Six Sigma Projects	Traditional Projects
Black Belt	Project Manager (Strong matrix)
Green Belts	Core Team Members
Yellow Belts	Team Members
Master Black Belts	Project Management Office
Champions	Project Sponsor

Six Sigma Project Methodology



DMAIC

Key Success Factors

- Executive Management Commitment
- Organizational Involvement
- Project Governance (Strong matrix organization)
 - ➔ Resource availability
- Careful selection at project initiation

Continued...

Key Success Factors (Continued)

- Project Management and Control (clear scope, short duration, milestone reporting, common methodology, and risk management)
- Rigorous evaluation at project completion
- Encouraging and Accepting Cultural Change
- Education and Training

Obstacles and Challenges

- Issues of Strategy
 - Anything new?
- Organizational Culture
 - Organizational commitment and governance
 - Clear Understanding of Six Sigma
 - Appropriate selection of Black Belts and resources
- Training
 - Inadequate training is likely to result in failure

Key Findings

- Six Sigma has benefited from the lessons learned in prior waves of quality management initiatives
- Focus on improvement of
 - Project performance
 - Project management performance
 - Organizational performance

Potential Future Research

- Detailed interviews of leaders and participants in Six Sigma projects
- Surveys of appropriate participants
- Applications in traditional projects
- Applications in high reliability organizations

Thank You and Questions??

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